



SEQUENCE LISTING

GENERAL INFORMATION:

(i) APPLICANT: Oon, Chong Jin
Lim, Gek Keow
Leong, Ai Lin
Zhao, Yi
Chen, Wei Ning

(ii) TITLE OF INVENTION: A VACCINE-INDUCED HEPATITIS B VIRAL
STRAIN AND USES THEREOF

(iii) NUMBER OF SEQUENCES: 11

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: Ladas & Parry
(B) STREET: 26 West 61 Street
(C) CITY: New York
(D) STATE: New York
(E) COUNTRY: USA
(F) ZIP: 10023

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0, Version #1.30

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: 09/719,533
(B) FILING DATE: 13-DEC-2000
(C) CLASSIFICATION: 435

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: PCT/SG98/00045
(B) FILING DATE: 19-JUN-1998

(viii) ATTORNEY/AGENT INFORMATION:

(A) NAME: Mass, Clifford J.
(B) REGISTRATION NUMBER: 30,086
(C) REFERENCE/DOCKET NUMBER: U-013108-9

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: (212) 708-1890

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 3215 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: double
(D) TOPOLOGY: circular

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

CTCCACCACT TTCCACCAAA CTCTTCAAGA TCCCAGAGTC AGGGCCCTGT ACTTTCCTGC

TGGTGGCTCC	AGTTCAGGAA	CAGTGAGCCC	TGCTCAGAAT	ACTGTCTCTG	CCATATCGTC	120
AATCTTATCG	AAGACTGGGG	ACCCTGTACC	GAACATGGAG	AACATCGCAT	CAGGACTCCT	180
AGGACCCCTG	CTCGTGTTAC	AGGCGGGGTT	TTTCTTGTTG	ACAAAAATCC	TCACAATACC	240
GCAGAGTCTA	GACTCGTGGT	GGACTTCTCT	CAATTTTCTA	GGGGGAACAC	CCGTGTGTCT	300
TGGCCAAAAT	TCGCAGTCCC	AAATCTCCAG	TCACTCACCA	ACCTGTTGTC	CTCCAATTTG	360
TCCTGGTTAT	CGCTGGATGT	GTCTGCGGCG	TTTATCATC	TTCCTCTGCA	TCCTGCTGCT	420
ATGCCTCATC	TTCTTGTTGG	TTCTTCTGGA	CTATCAAGGT	ATGTTGCCCC	TTTGTCTCTT	480
AATTCAGGA	TCAACAACAA	CCAGCACCGG	ACCATGCAAA	ACCTGCACAA	CTCCTGCTCA	540
AGGAACCTCT	ATGTTTCCCT	CATGTTGCTG	TACAAAACCT	ACGGACAGAA	ACTGCACCTG	600
TATTCCCATC	CCATCATCTT	GGGCTTTCGC	AAAATACCTA	TGGGAGTGGG	CCTCAGTCCG	660
TTTCTCTTGG	CTCAGTTTAC	TAGTGCCATT	TGTTCACTGG	TTCGTAGGGC	TTTCCCCCAC	720
TGTCTGGCTT	TCAGTTATAT	GGATGATGTG	GTTTTGGGGG	CCAAGTCTGT	ACAACATCTT	780
GAGTCCCTTT	ATGCCGCTGT	TACCAATTTT	CTTTTGTCTT	TGGGTATACA	TTTAAACCCT	840
CACAAAACAA	AAAGATGGGG	ATATTCCCTT	AACCTCATGG	GATATGTCAT	TGGGAGTTGG	900
GGCACATTGC	CACAGGAACA	TATTGTACAA	AAAATCAAAA	TGTGTTTTAG	GAAACTTCCT	960
GTAAACAGGC	CTATTGATTG	GAAAGTATGT	CAACGAATTG	TGGGTCTTTT	GGGGTTTGCC	1020
GCCCCTTTCA	CGCAATGTGG	ATATCCTGCT	TTAATGCCTT	TATATGCATG	TATACAAGCA	1080
AAACAGGCTT	TTACTTTCTC	GCAAACCTAC	AAGACCTTTC	TAAGTAAACA	GTATCTGAAC	1140
CTTTACCCCG	TTGCTCGGCA	ACGCCCTGGT	CTGTGCCAAG	TGTTTGCTGA	CGCAACCCCC	1200
ACTGGTTGGG	GCTTGGCCAT	AGGCCATCAG	CGCATGCGTG	GAACCTTTGT	GTCTCCTCTG	1260
CCGATCCATA	CTGCGGAACT	CCTAGCCGCT	TGTTTTGCTC	GCAGCAGGTC	TGGGGCAAAA	1320
CTCATCGGGA	CTGACAATTC	TGTCGTGCTC	TCCCGCAAGT	ATACATCATT	TCCATGGCTG	1380
CTAGGCTGTG	CTGCCAACTG	GATCCTGCGC	GGGACGTCCT	TTGTTTACGT	CCCGTCGGCG	1440
CTGAATCCCG	CGGACGACCC	CTCCCGGGGC	CGCTTGGGGC	TCTACCGCCC	GCTTCTCCGC	1500
CTGTTATACC	GACCGACCAC	GGGGCGCACC	TCTCTTTACG	CGGACTCCCC	GTCTGTGCCT	1560
TCTCATCTGC	CGGACCGTGT	GCACTTCGCT	TCACCTCTGC	ACGTCGCATG	GAGACCACCG	1620
TGAACGCCCA	CGGGAACCTG	CCCAAGGTCT	TGCATAAGAG	GACTCTTGGA	CTTTCAGCAA	1680
TGTCAACGAC	CGACCTTGAG	GCATACTTCA	AAGACTGTGT	GTTTAATGAG	TGGGAGGAGT	1740

TGGGGGAGGA	GGTTAGGTTA	AAGGTCTTTG	TACTAGGAGG	CTGTAGGCAT	AAATTGGTGT	1800
GTTCAACATC	ACCATGCAAC	TTTTTCACCT	CTGCCTAATC	ATCTCATGTT	CATGTCCTAC	1860
TGTTCAAGCC	TCCAAGCTGT	GCCTTGGGTG	GCTTTGGGGC	ATGGACATTG	ACCCGTATAA	1920
AGAATTTGGA	GCTTCTGTGG	AGTTACTCTC	TTTTTTGCCT	TCTGACTTTT	TTCCTTCTAT	1980
TCGAGATCTC	CTCGACACCG	CCTCTGCTCT	GTATCGGGAG	GCCTTAGAGT	CTCCGGAACA	2040
TTGTTCACCT	CACCATACGG	CACTCAGGCA	AGCTATTCTG	AGTTGGGGTG	AGTTAATGAA	2100
TCTAGCCACC	TGGGTGGGAA	GTAATTTGGA	AGATCCAGCA	TCCAGGGAAT	TAGTAGTCAG	2160
CTATGTCAAC	GTTAATATGG	GCCTAAAAAT	CAGACAACTA	TTGTGGTTTC	ACATTTCTTG	2220
TCTTACTTTT	GGGAGAGAAA	CTGTTCTTGA	ATATTTGGTG	TCTTTTGGAG	TGTGGATTCTG	2280
CACTCCTCCT	GCATATAGAC	CACCAAATGC	CCCTATCTTA	TCAACACTTC	CGGAAACTAC	2340
TGTTGTTAGA	CGAAGAGGCA	GGTCCCCTAG	AAGAAGAACT	CCCTCGCCTC	GCAGACGAAG	2400
GTCTCAATCG	CCGCGTCGCA	GAAGATCTCA	ATCTCGGGAA	TCTCAATGTT	AGTATTCCTT	2460
GGACACATAA	GGTGGGAAAC	TTTACGGGGC	TTTATTCTTC	TACGGTACCT	TGCTTTAATC	2520
CTAAATGGCA	AATCCTTCT	TTTCCGGACA	TTCATTTGCA	GGAGGACATT	CTTGATAGAT	2580
GTAAGCAATT	TGTGGGGCCC	CTTACAGTAA	ATGAAAACAG	GAGACTAAAA	TTAATTATGC	2640
CTGCTAGGTT	TTATCCAAAT	GTTACTAAAT	ATTTGCCCTT	AGATAAAGGG	ATCAAACCAT	2700
ATTATCCAGA	GTATGTAGTT	AATCATTACT	TCCAGACGCG	ACATTATTTA	CACACTCTTT	2760
GGAAGGCGGG	GATCTTATAT	AAAAGAGAGT	CCACACGTAG	CGCCTCATTT	TGCGGGTCAC	2820
CATATTCTTG	GGAACAAGAT	CTACAGCATG	GGAGGTTGGT	CTTCCAAACC	TCGAAAAGGC	2880
ATGGGGACAA	ATCTTTCTGT	CCCCAATCCC	CTGGGATTCT	TCCCCGATCA	TCAGTTGGAC	2940
CCTGCATTCA	AAGCCAACTC	AGAAAATCCA	GATTGGGACC	TCAACCCGCA	CAAGGACAAC	3000
TGGCCGGACG	CCAACAAGGT	GGGAGTGGGA	GCATTGGGGC	CAGGGTTCAC	CCCTCCTCAT	3060
GGGGGACTGT	TGGGGTGGAG	CCCTCAGGCT	CAGGGCCTAC	TCACAACTGT	GCCAGCAGCT	3120
CCTCCTCCTG	CCTCCACCAA	TCGGCAGTCA	GGAAGGCAGC	CTACTCCCTT	ATCTCCACCT	3180
CTAAGGGACA	CTCATCCTCA	GGCCATGCAG	TGGAA			3215

(2) INFORMATION FOR SEQ ID NO:2:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 843 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Met	Pro	Leu	Ser	Tyr	Gln	His	Phe	Arg	Lys	Leu	Leu	Leu	Leu	Asp	Glu	
1				5					10					15		
Glu	Ala	Gly	Pro	Leu	Glu	Glu	Glu	Leu	Pro	Arg	Leu	Ala	Asp	Glu	Gly	
			20					25					30			
Leu	Asn	Arg	Arg	Val	Ala	Glu	Asp	Leu	Asn	Leu	Gly	Asn	Leu	Asn	Val	
		35					40					45				
Ser	Ile	Pro	Trp	Thr	His	Lys	Val	Gly	Asn	Phe	Thr	Gly	Leu	Tyr	Ser	
	50					55					60					
Ser	Thr	Val	Pro	Cys	Phe	Asn	Pro	Lys	Trp	Gln	Thr	Pro	Ser	Phe	Pro	
65					70					75					80	
Asp	Ile	His	Leu	Gln	Glu	Asp	Ile	Leu	Asp	Arg	Cys	Lys	Gln	Phe	Val	
				85					90					95		
Glu	Pro	Leu	Thr	Val	Asn	Glu	Asn	Arg	Arg	Leu	Lys	Leu	Ile	Met	Pro	
			100					105					110			
Ala	Arg	Phe	Tyr	Pro	Asn	Val	Thr	Lys	Tyr	Leu	Pro	Leu	Asp	Lys	Gly	
		115					120					125				
Ile	Lys	Pro	Tyr	Tyr	Pro	Glu	Tyr	Val	Val	Asn	His	Tyr	Phe	Gln	Thr	
	130					135					140					
Arg	His	Tyr	Leu	His	Thr	Leu	Trp	Lys	Ala	Gly	Ile	Leu	Tyr	Lys	Arg	
145					150					155					160	
Glu	Ser	Thr	Arg	Ser	Ala	Ser	Phe	Cys	Gly	Ser	Pro	Tyr	Ser	Trp	Glu	
				165					170					175		
Gln	Asp	Leu	Gln	His	Gly	Arg	Leu	Val	Phe	Gln	Thr	Ser	Lys	Arg	His	
			180					185					190			
Gly	Asp	Lys	Ser	Phe	Cys	Pro	Glu	Ser	Pro	Gly	Ile	Leu	Pro	Arg	Ser	
		195					200					205				
Ser	Val	Gly	Pro	Cys	Ile	Gln	Ser	Gln	Leu	Arg	Lys	Ser	Arg	Leu	Gly	
	210					215					220					
Pro	Gln	Pro	Ala	Gln	Gly	Gln	Leu	Ala	Gly	Arg	Gln	Gln	Gly	Gly	Ser	
225				230						235					240	
Gly	Ser	Ile	Arg	Ala	Arg	Val	His	Pro	Ser	Ser	Trp	Gly	Thr	Val	Gly	
				245					250					255		
Val	Glu	Pro	Ser	Gly	Ser	Gly	Pro	Thr	His	Asn	Cys	Ala	Ser	Ser	Ser	
			260					265					270			

Ser Ser Cys Leu His Gln Ser Ala Val Arg Lys Ala Ala Tyr Ser Leu
 275 280 285

Ile Ser Thr Ser Lys Gly His Ser Ser Ser Gly His Ala Val Glu Leu
 290 295 300

His His Phe Pro Pro Asn Ser Ser Arg Ser Gln Ser Gln Gly Pro Val
 305 310 315 320

Leu Ser Cys Trp Trp Leu Gln Phe Arg Asn Ser Glu Pro Cys Ser Glu
 325 330 335

Tyr Cys Leu Cys His Ile Val Asn Leu Ile Glu Asp Trp Gly Pro Cys
 340 345 350

Thr Glu His Gly Glu His Arg Ile Arg Thr Pro Arg Thr Pro Ala Arg
 355 360 365

Val Thr Gly Gly Val Phe Leu Val Asp Lys Asn Pro His Asn Thr Ala
 370 375 380

Glu Ser Arg Leu Val Val Asp Phe Ser Gln Phe Ser Arg Gly Asn Thr
 385 390 395 400

Arg Val Ser Trp Pro Lys Phe Ala Val Pro Asn Leu Gln Ser Leu Thr
 405 410 415

Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu Ser Leu Asp Val Ser Ala
 420 425 430

Ala Phe Tyr His Leu Pro Leu His Pro Ala Ala Met Pro His Leu Leu
 435 440 445

Val Gly Ser Ser Gly Leu Ser Arg Tyr Val Ala Arg Leu Ser Ser Asn
 450 455 460

Ser Arg Ile Asn Asn Asn Glu His Arg Thr Met Glu Asn Leu His Asn
 465 470 475 480

Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu Met Leu Leu Tyr Lys Thr
 485 490 495

Tyr Gly Gln Lys Leu His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe
 500 505 510

Arg Lys Ile Pro Met Gly Val Gly Leu Ser Pro Phe Leu Leu Ala Gln
 515 520 525

Phe Thr Ser Ala Ile Cys Ser Val Val Arg Arg Ala Phe Pro His Cys
 530 535 540

Leu Ala Phe Ser Tyr Met Asp Asp Val Val Leu Gly Ala Lys Ser Val
 545 550 555 560

Gln His Leu Glu Ser Leu Tyr Ala Ala Val Thr Asn Phe Leu Leu Ser
 565 570 575

Leu	Gly	Ile	His	Leu	Asn	Pro	His	Lys	Thr	Lys	Arg	Trp	Gly	Tyr	Ser	580	585	590
Leu	Asn	Phe	Met	Gly	Tyr	Val	Ile	Gly	Ser	Trp	Gly	Thr	Leu	Pro	Gln	595	600	605
Glu	His	Ile	Val	Gln	Lys	Ile	Lys	Met	Cys	Phe	Arg	Lys	Leu	Pro	Val	610	615	620
Asn	Arg	Pro	Ile	Asp	Trp	Lys	Val	Cys	Gln	Arg	Ile	Val	Gly	Leu	Leu	625	630	635
Gly	Phe	Ala	Ala	Pro	Phe	Thr	Gln	Cys	Gly	Tyr	Pro	Ala	Leu	Met	Pro	645	650	655
Leu	Tyr	Ala	Cys	Ile	Gln	Ala	Lys	Gln	Ala	Phe	Thr	Phe	Ser	Gln	Thr	660	665	670
Tyr	Lys	Thr	Phe	Leu	Ser	Lys	Gln	Tyr	Leu	Asn	Leu	Tyr	Pro	Val	Ala	675	680	685
Arg	Gln	Arg	Pro	Gly	Leu	Cys	Glu	Val	Phe	Ala	Asp	Ala	Thr	Pro	Thr	690	695	700
Gly	Trp	Gly	Leu	Ala	Ile	Gly	His	Gln	Arg	Met	Arg	Gly	Thr	Phe	Val	705	710	715
Ser	Pro	Leu	Pro	Ile	His	Thr	Ala	Glu	Leu	Leu	Ala	Ala	Cys	Phe	Ala	725	730	735
Arg	Ser	Arg	Ser	Gly	Ala	Lys	Leu	Ile	Gly	Thr	Asp	Asn	Ser	Val	Val	740	745	750
Leu	Ser	Arg	Lys	Tyr	Thr	Ser	Phe	Pro	Trp	Leu	Leu	Gly	Cys	Ala	Ala	755	760	765
Asn	Trp	Ile	Leu	Arg	Gly	Thr	Ser	Phe	Val	Tyr	Val	Pro	Ser	Ala	Leu	770	775	780
Asn	Pro	Ala	Asp	Asp	Pro	Ser	Arg	Gly	Arg	Leu	Gly	Leu	Tyr	Arg	Pro	785	790	795
Leu	Leu	Arg	Leu	Leu	Tyr	Arg	Pro	Thr	Thr	Gly	Arg	Thr	Ser	Leu	Tyr	805	810	815
Ala	Asp	Ser	Pro	Ser	Val	Pro	Ser	His	Leu	Pro	Asp	Arg	Val	His	Phe	820	825	830
Ala	Ser	Pro	Leu	His	Val	Ala	Trp	Arg	Pro	Pro						835	840	

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 400 amino acids
 (B) TYPE: amino acid
 (C) STRANDEDNESS: single
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Met	Gly	Gly	Trp	Ser	Ser	Lys	Pro	Arg	Lys	Gly	Met	Gly	Thr	Asn	Leu	1	5	10	15
Ser	Val	Pro	Asn	Pro	Leu	Gly	Phe	Phe	Pro	Asp	His	Gln	Leu	Asp	Pro	20	25	30	
Ala	Phe	Lys	Ala	Asn	Ser	Glu	Asn	Pro	Asp	Trp	Asp	Leu	Asn	Pro	His	35	40	45	
Lys	Asp	Asn	Trp	Pro	Asp	Ala	Asn	Lys	Val	Gly	Val	Gly	Ala	Phe	Gly	50	55	60	
Pro	Gly	Phe	Thr	Pro	Pro	His	Gly	Gly	Leu	Leu	Gly	Trp	Ser	Pro	Gln	65	70	75	80
Ala	Gln	Gly	Leu	Leu	Thr	Thr	Val	Pro	Ala	Ala	Pro	Pro	Pro	Ala	Ser	85	90	95	
Thr	Asn	Arg	Gln	Ser	Gly	Arg	Gln	Pro	Thr	Pro	Leu	Ser	Pro	Pro	Leu	100	105	110	
Arg	Asp	Thr	His	Pro	Gln	Ala	Met	Gln	Trp	Asn	Ser	Thr	Thr	Phe	His	115	120	125	
Gln	Thr	Leu	Gln	Asp	Pro	Arg	Val	Arg	Ala	Leu	Tyr	Phe	Pro	Ala	Gly	130	135	140	
Gly	Ser	Ser	Ser	Gly	Thr	Val	Ser	Pro	Ala	Gln	Asn	Thr	Val	Ser	Ala	145	150	155	160
Ile	Ser	Ser	Ile	Leu	Ser	Lys	Thr	Gly	Asp	Pro	Val	Pro	Asn	Met	Glu	165	170	175	
Asn	Ile	Ala	Ser	Gly	Leu	Leu	Gly	Pro	Leu	Leu	Val	Leu	Gln	Ala	Gly	180	185	190	
Phe	Phe	Leu	Leu	Thr	Lys	Ile	Leu	Thr	Ile	Pro	Gln	Ser	Leu	Asp	Ser	195	200	205	
Trp	Trp	Thr	Ser	Leu	Asn	Phe	Leu	Gly	Gly	Thr	Pro	Val	Cys	Leu	Gly	210	215	220	
Gln	Asn	Ser	Gln	Ser	Gln	Ile	Ser	Ser	His	Ser	Pro	Thr	Cys	Cys	Pro	225	230	235	240
Pro	Ile	Cys	Pro	Gly	Tyr	Arg	Trp	Met	Cys	Leu	Arg	Arg	Phe	Ile	Ile	245	250	255	

Phe	Leu	Cys	Ile	Leu	Leu	Leu	Cys	Leu	Ile	Phe	Leu	Leu	Val	Leu	Leu	
			260					265					270			
Asp	Tyr	Gln	Gly	Met	Leu	Pro	Val	Cys	Pro	Leu	Ile	Pro	Gly	Ser	Thr	
		275					280					285				
Thr	Thr	Ser	Thr	Gly	Pro	Cys	Lys	Thr	Cys	Thr	Thr	Pro	Ala	Gln	Gly	
	290					295					300					
Thr	Ser	Met	Phe	Pro	Ser	Cys	Cys	Cys	Thr	Lys	Pro	Thr	Asp	Arg	Asn	
305					310					315					320	
Cys	Thr	Cys	Ile	Pro	Ile	Pro	Ser	Ser	Trp	Ala	Phe	Ala	Lys	Tyr	Leu	
				325					330					335		
Trp	Glu	Trp	Ala	Ser	Val	Arg	Phe	Ser	Trp	Leu	Ser	Leu	Leu	Val	Pro	
			340					345					350			
Phe	Val	Gln	Trp	Phe	Val	Gly	Leu	Ser	Pro	Thr	Val	Trp	Leu	Ser	Val	
		355					360					365				
Ile	Trp	Met	Met	Trp	Phe	Trp	Gly	Pro	Ser	Leu	Tyr	Asn	Ile	Leu	Ser	
	370					375					380					
Pro	Phe	Met	Pro	Leu	Leu	Pro	Ile	Phe	Phe	Cys	Leu	Trp	Val	Tyr	Ile	
385					390					395					400	

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 212 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Met	Gln	Leu	Phe	His	Leu	Cys	Leu	Ile	Ile	Ser	Cys	Ser	Cys	Pro	Thr	
1				5				10						15		
Val	Gln	Ala	Ser	Lys	Leu	Cys	Leu	Gly	Trp	Leu	Trp	Gly	Met	Asp	Ile	
		20						25					30			
Asp	Pro	Tyr	Lys	Glu	Phe	Gly	Ala	Ser	Val	Glu	Leu	Leu	Ser	Phe	Leu	
	35						40					45				
Pro	Ser	Asp	Phe	Phe	Pro	Ser	Ile	Arg	Asp	Leu	Leu	Asp	Thr	Ala	Ser	
	50					55					60					
Ala	Leu	Tyr	Arg	Glu	Ala	Leu	Glu	Ser	Pro	Glu	His	Cys	Ser	Pro	His	
65					70					75				80		
His	Thr	Ala	Leu	Arg	Gln	Ala	Ile	Leu	Ser	Trp	Gly	Glu	Leu	Met	Asn	

	85		90		95
Leu Ala Thr Trp Val Gly Ser Asn Leu Glu Asp Pro Ala Ser Arg Glu					
	100		105		110
Leu Val Val Ser Tyr Val Asn Val Asn Met Gly Leu Lys Ile Arg Gln					
	115		120		125
Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val					
	130		135		140
Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala					
	145		150	155	160
Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr					
	165		170		175
Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro					
	180		185		190
Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Arg					
	195		200		205
Glu Ser Gln Cys					
	210				

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 154 amino acids
 - (B) TYPE: amino acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Met Ala Ala Arg Leu Cys Cys Gln Leu Asp Pro Ala Arg Asp Val Leu					
1		5		10	15
Cys Leu Arg Pro Val Gly Ala Glu Ser Arg Gly Arg Pro Leu Pro Gly					
	20		25		30
Pro Leu Gly Ala Leu Pro Pro Ala Ser Pro Pro Val Ile Pro Thr Asp					
	35		40		45
His Gly Ala His Leu Ser Leu Arg Gly Leu Pro Val Cys Ala Phe Ser					
	50		55		60
Ser Ala Gly Pro Cys Ala Leu Arg Phe Thr Ser Ala Arg Arg Met Glu					
65		70		75	80
Thr Thr Val Asn Ala His Gly Asn Leu Pro Lys Val Leu His Lys Arg					
	85		90		95
Thr Leu Gly Leu Ser Ala Met Ser Thr Thr Asp Leu Glu Ala Tyr Phe					
	100		105		110

Lys	Asp	Cys	Val	Phe	Asn	Glu	Trp	Glu	Glu	Leu	Gly	Glu	Glu	Val	Arg
		115					120					125			
Leu	Lys	Val	Phe	Val	Leu	Gly	Gly	Cys	Arg	His	Lys	Leu	Val	Cys	Ser
	130					135					140				
Pro	Ser	Pro	Cys	Asn	Phe	Phe	Thr	Ser	Ala						
145						150									

(2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 36 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

ATAAGCTTAT GCCCCTATCT TATCAACACT TCCGGA 36

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 25 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

GAGTCTAGAC TCTGCGGTAT TGTGA 25

(2) INFORMATION FOR SEQ ID NO:8:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 25 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

GAGTCTAGAC TCGTGGTGGA CTTCT 25

(2) INFORMATION FOR SEQ ID NO:9:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 32 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

TGAGAATTCT CACGGTGGTC TCCATGCGAC GT

32

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 16 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

TTTGTTTACG TCCCGT

16

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 27 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11

CTAAGCTTAG TTTCCGGAAG TGTTGAT

27